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Transmitted herewith for filing under *35 USC 111* and *37 CFR 1.53* is the ☐ Design ☒ Utility patent application of:

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ENTITLED: ACTIVE CAPACITOR REGULATING TYPE CONTROLLABLE VOLTAGE AND CURRENT POWER SUPPLY CIRCUIT

Enclosed are:

- ☒ 46 page(s) of written description, claims and abstract.
- ☒ 8 sheet(s) of drawings.
- ☐ An assignment of the invention to
- ☒ Executed declaration of the inventor(s).
- ☐ A certified copy of a _____ application. Priority is claimed if not already of record.
- ☒ A verified statement to establish small entity status under *37 CFR 1.9* and *37 CFR 1.27*.
- ☐ Preliminary amendment.
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THE ACTIVE CAPACITOR REGULATING TYPE CONTROLLABLE VOLTAGE AND CURRENT POWER SUPPLY CIRCUIT

SUMMARY OF THE INVENTION

The active capacitor regulating type controllable voltage and current power supply circuit is disclosed with a voltage reducing and current limiting rectifying circuit which is constituted by capacitors and a bridge type current rectifier device, wherein it is characterized in that the output terminals of the rectifying circuit are parallel installed with a current distributing circuit device, thereby to actively control the output voltage setting status.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is the basic circuit block diagram of the invention.

Figure 2 is a circuit schematic diagram of the invention illustrating that the active capacitor is directly series combined with the AC input terminal of the full wave current rectifier device.

Figure 3 is a circuit schematic diagram of the invention illustrating that the active capacitor is series combined with the primary winding of the transformer whereby through the secondary winding of the transformer to provide output to the full wave current rectifier device.

Figure 4 is a circuit schematic diagram of the invention illustrating that the active capacitor is series combined between the secondary winding of the transformer and the current rectifier device.

Figure 5 is a circuit schematic diagram of the invention illustrating that the active capacitor is series combined

with the primary winding of the transformer whereby the secondary winding of the transformer with intermediate extractions and two diodes constitute a full wave current rectifier circuit.

Figure 6 is a circuit schematic diagram of the invention illustrating that three active capacitors are each respectively series combined between the three phase AC power source and the three phase full wave current rectifier device.

Figure 7 is a circuit schematic diagram of the invention illustrating that three active capacitors are each respectively series combined between the secondary winding of the three phase transformer and the three phase full wave current rectifier device.

Figure 8 is a circuit schematic diagram of the invention illustrating that the active capacitor is series installed between the single phase power source and the load, while the AC terminals of the full current bridge type current rectifier are parallel combined with the two AC output terminals.

Figure 9 is a circuit schematic diagram of the invention illustrating that the front section DC output terminals are directly parallel combined with a controllable current distributing device.

Figure 10 is a circuit schematic diagram of the invention illustrating that the DC output terminals are first parallel combined with wave filter capacitor and then parallel combined with a controllable current distributing device.

Figure 11 is a circuit schematic diagram of the

invention illustrating that controllable current distributing device comprising of linear or switching type solid state controllable current distributing components or electromechanical components are controlled by a voltage output control device with fixed bias.

Figure 12 is a circuit schematic diagram of the invention illustrating that the controllable current distributing device comprising of thyristors is controlled by a voltage output control device with controllable voltage output.

Figure 13 is a circuit schematic diagram of the invention illustrating that the proportional bias voltage circuit constituted by the voltage distributing resistors and the zener diode which is series combined between the power source and control terminal of the controllable current distributing device.

Figure 14 is a circuit schematic diagram of the invention illustrating that the controllable current distributing device is controlled by a voltage output control device with adjustable and setting permissive bias.

Figure 15 is a circuit schematic diagram of the invention illustrating that the controllable current distributing device is controlled by the pulse-width modulation functioning voltage output control device for pulse-width modulation voltage output control.

Figure 16 is a circuit schematic diagram of the invention illustrating that the controllable current distributing device comprised of thyristors can be controlled by a phase angle triggering modulation output

voltage control device.

Figure 17 is a circuit schematic diagram of the invention, wherein its output terminals are series combined with a isolating diode in the current direction.

Figure 18 is a circuit schematic diagram of the invention illustrating that the output terminals are parallel combined with a wave filter capacitor.

Figure 19 is a circuit schematic diagram of the invention illustrating that the active capacitor is series combined between the single phase AC current power source and the load, while the two AC power output terminals leading to the load are parallel combined with a full wave current rectifier device and a controllable current distributing device.

Figure 20 is the first example of the invention illustrating the multiple voltage extractions output circuit.

Figure 21 is the second example of the invention illustrating the multiple voltage extractions output circuit.

Figure 22 is the third example of the invention illustrating the multiple voltage extractions output circuit.

Figure 23 is a circuit schematic diagram of the invention illustrating that a primary voltage stabilizing circuit is installed ahead of the output terminals.

DETAILED DESCRIPTION OF THE INVENTION

if compared with the conventional DC power supply circuit which reduces voltage by transformers, the conventional power supply circuit which uses the active capacitor as

the voltage reducing component and the bridge type current rectifier device for converting AC current to DC current has a smaller volume, lesser weight, and lower cost, while if compared with high frequency carrier wave controlled switching type power supply circuit, it has a similar volume and weight but less heat loss and even lower cost as well as no noise interference (EMC), therefore it is gradually expanded from low power applications to medium and large power applications, thereof using the active capacitor as a voltage reducing component is same as using the conventional series combined active resistors, the output terminal voltage is reverse related to the output current , i.e. when the output current is increased, the output terminal voltage is reduced while when the output current is decreased, the output terminal voltage will be raised, in addition, the active capacitor regulating type controllable voltage and current power supply circuit can be further installed with a controllable current distributing circuit device parallel combined with the output terminals of the current rectifier device, whereby to actively control the output voltage stabilized at the setting value.

The basic operating principles and application examples of the invention are described below:

Figure 1 is the basic circuit block diagram of the Power supply circuit with controllable voltage and current through regulation of the active capacitor, which is mainly comprised of the following:

- An AC power Source 100: It is a single phase or multiple phase power source coming from city power or from the

secondary AC power source of transformer;

- An active capacitor 101: It is constituted by all kinds of capacitors 101 suitable for application with AC power, thereof it can be directly series combined between the AC power source 100 and the current rectifier device 103 or can be series combined between the AC power source 100 and the primary terminals of transformer 102; or can be series combined between the secondary terminals of transformer 102 and current rectifier device 103; wherein the two end terminals of capacitor 101 can be further parallel combined with relieving resistor R101;
- A transformer 102: The transformer 102 is installed between the AC power source 100 and current rectifier device 103 for changing the voltage value of the AC power source 100, wherein it is comprised of an isolated type structure with primary and secondary isolated windings or a self-coupled transformer structure with self-coupled windings, whereof its secondary output windings can be a three terminals type secondary windings with intermediate extractions or the two terminals type secondary windings; whereof the transformer 102 is a selective device which can be installed if required by the circuit, and the active capacitor 101 can be series combined between the primary terminals or secondary terminals of the transformer 102, or the transformer 102 can be omitted instead while the AC power source 100 and the active capacitor 101 is directly series combined before providing input to the current rectifier device 103;
- A current rectifier device 103: It is a full wave bridge

type current rectifier device comprised of solid state rectifiers for converting input AC power into full wave DC output;

- A first wave filter capacitor 104: It is parallel combined between the output positive and negative terminals of the current rectifier device 103 whereby to reduce voltage pulsation, wherein the capacitor can be selected to be installed or not installed;
- A controllable current distributing device 105: It is constituted by a linear or switching type solid state or electromechanical components or thyristors, wherein it is parallel combined between the output terminals of the current rectifier device 103 to generate linear or switching type current distributing functions at load decrease or output voltage increase of current rectifier 103 due to rising power source terminal voltage, thereby to maintain a stable output voltage;
- An output voltage control device 106: It is comprised of electromechanical or solid state components for controlling the operating status of the controllable current distributing device 105, and further to control the output terminal voltage of the active capacitor regulating type controllable voltage and current power supply circuit; wherein it is comprised of : 1) the current limiting resistor R110 and zener diode ZD110 are series combined and are then parallel combined between the power source and control terminal of the controllable current distributing device thereby to constitute a voltage output control device with a fixed bias; 2) the fixed voltage distributing resistors R111,

R112 are parallel combined between the two terminals of power source, while a zenor diode ZD110 can be series combined between its extraction terminal and the controllable current distributing device thereby to constitute a voltage output control device with a proportional bias; 3) a variable resistor VR110 can be parallel combined between the two terminals of power source, while a zener diode ZD110 can be series combined between the output terminal of the variable resistor and the controllable current distributing device thereby to constitute a voltage output control device with a controllable bias; 4) the voltage output control device comprising of the pulse-width modulation functioning output voltage control device CL110 is used to perform PWM control the controllable current distributing device; 5) the voltage output control device is constituted by a phase angle triggering modulation circuit;

- A isolating diode 107: it is for series combined between the power source output terminal leading to the second wave filter capacitor 108 and further to the load 109, thereby to prevent the accumulated power at the second wave filter capacitor 108 from flowing back to the power source; therein the isolating diode 107 can be selected to be installed or not installed according to circuit requirement;
- A second wave filter capacitor 108: it is parallel combined between the circuit output terminals leading to the load for further reducing the voltage pulsation, wherein the capacitor can be selected to be installed or not installed;

- A load 109: it is a resistive load or resistive and inductive mixing type load or rechargeable and accumulative type load or rotational electrical machine type load for matching with the active capacitor regulating type controllable voltage and current power supply circuit;
- The active capacitor regulating type controllable voltage and current power supply circuit can be installed with various type overload or short circuit protecting components such as safe fuse, circuit breaker and various surge voltage absorbing protective components as well as various noise absorbing components;
- A load terminal voltage detector device 110: it is coupled between the two terminals of load 109 for transferring the detected voltage feedback signal to the output voltage control device 106 thereby to provide voltage feedback control function on the controllable current distributing device, whereof the load terminal voltage detector device is comprised of electromechanical or solid state circuit components, which can be selected to be installed or not installed;
- A load current detector device 111: it is series combined between the load 109 and the power source for transferring detected current signal to the voltage output control device 106 thereby to provide current feedback control function on controllable current distributing device 105, whereof the load current detector device 111 is comprised of electromechanical or solid state circuit components, which can be selected to be installed or not installed;

- A control interface 112: it is a manual or electromechanical signal control interface comprised of electromechanical or solid state circuit components for controlling the voltage output control device 106 and controllable current distributing device 105, wherein the control interface 112 can be selected to be installed or not installed according to system requirements.

Figure 1 is the basic circuit structure of the subject design, wherein with the common basic features, according to the different omission and addition of circuit components as well as function selections, the circuit can be divided into the front section current rectifying circuit from AC input to full wave rectified current output and the rear section output circuit from full wave DC power source to the load, herein the various circuit embodying examples of the front section current rectifying circuit and the rear section output circuit are respectively described as below:

Depending on whether the transformer is selected, output types of the transformer secondary windings as well as their matching full wave current rectifier device and the series combined positions of active capacitor, the front section current rectifying circuit of the embodying example illustrated in figure 1 has the following circuit embodying types:

1) The active capacitor 101 is directly series combined with the AC input terminals of the full wave current rectifier device 103, such as that figure 2 is a circuit schematic diagram of the active capacitor

regulating type controllable voltage and current power supply circuit illustrating that the active capacitor is directly series combined with the AC input terminal of the full wave current rectifier device.

2) The active capacitor 101 is series combined with the primary windings of transformer 102, and through the secondary windings of transformer 102 to transfer output to the full wave current rectifier device 103, such as that figure 3 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the active capacitor is series combined with the primary winding of the transformer whereby through the secondary winding of the transformer to provide output to the full wave current rectifier device.

3) The active capacitor 101 is series combined between the secondary winding of the transformer 102 and the current rectifier device 103, such as that figure 4 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the active capacitor is series combined between the secondary winding of the transformer and the current rectifier device.

4) The active capacitor 101 is series combined with the primary winding of the transformer 102 whereby the secondary winding of the transformer 102 with intermediate extractions and two diodes constitute a full wave current rectifier circuit, such as that figure 5 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and

current power supply circuit illustrating that the active capacitor is series combined with the primary winding of the transformer whereby the secondary winding of the transformer with intermediate extractions and two diodes constitute a full wave current rectifier circuit.

5) Three active capacitors 101 are each respectively series combined between the three phase AC power source and the three phase full wave current rectifier device 103, such as that figure 6 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that three active capacitors are each respectively series combined between the three phase AC power source and the three phase full wave current rectifier device.

6) The AC power source transfers output to the three phase transformer 102, whereby three active capacitors 101 are each respectively series combined between the secondary winding of the three phase transformer 102 and the three phase full wave current rectifier device 103, such as that figure 7 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that three active capacitors are each respectively series combined between the secondary winding of the three phase transformer and the three phase full wave current rectifier device.

7) The active capacitor 101 is series installed between the single phase power source 100 and the load 109,

while the AC terminals of the full current bridge type current rectifier 103 are parallel combined with the two AC output terminals, while the positive and negative terminals of the current rectifier device 103 are parallel combined in current direction with the controllable current distributing device 105 as well as that the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to control the output voltage control device 106 and further to modulate the AC output voltage or current, such as that figure 8 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the active capacitor is series installed between the single phase power source and the load, while the AC terminals of the full current bridge type current rectifier are parallel combined with the two AC output terminals.

Through matching with circuit components as well as function omissions and additions, the rear section output circuit of the embodying example illustrated in figure 1 has the following variations for application selections as described below:

8) The full wave rectified full wave pulsating DC output terminals are directly parallel combined with a controllable current distributing device 105 which is comprised of linear or switching type solid state or electromechanical components or thyristors for accepting

control by the voltage output control device 106, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required, such as that figure 9 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the front section DC output terminals are directly parallel combined with a controllable current distributing device.

9) The full wave rectified DC output terminals are first parallel combined with the first wave filter capacitor 104 and then parallel combined with a controllable current distributing device 105 which is comprised of linear or switching type solid state or electro-mechanical components or thyristors for accepting control by the voltage output control device 106, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required, such as that figure 10 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the DC output terminals are first parallel combined with wave filter capacitor and then parallel

combined with a controllable current distributing device.

10) The controllable current distributing device 105 comprising of linear or switching type solid state controllable current distributing components or electromechanical components are controlled by a voltage output control device 106 with fixed bias, wherein the fixed bias is obtained including from the series combined zener diode ZD101 (including the further series installed current limiting resistor R110), in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required, such as that figure 11 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that controllable current distributing device comprising of linear or switching type solid state controllable current distributing components or electromechanical components are controlled by a voltage output control device with fixed bias.

11) The controllable current distributing device 105 comprised of thyristor SCR110 is controlled by a variable resistor VR110, wherein the controllable voltage bias is obtained by the variable resistor VR110 and the series combined zener diode ZD110 with its

output terminals, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required, such as that figure 12 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the controllable current distributing device comprising of thyristors is controlled by a voltage output control device with controllable voltage output.

12) The voltage output control device 106 is constituted by series combining a zener diode ZD110 between the extraction terminal of the voltage distributing resistors R111 and R112 which is parallel combined between the two power source terminals and the control terminal of the controllable current distributing device 105, thereby to provide a proportional voltage bias for controlling the controllable current distributing device 105 comprised of linear or switching type solid state or electromechanical components or thyristor SCR110, wherein the aforesaid voltage distributing resistor includes the constitution by other voltage setting permissible circuits, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second

wave filter capacitor 108 can be selectively parallel installed between the output terminals as required, such as figure 13 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the proportional bias voltage circuit constituted by the voltage distributing resistors and the zener diode which is series combined between the power source and control terminal of the controllable current distributing device.

13) The voltage output control device 106 is constituted by series combining a zener diode ZD110 between the output terminal of the variable resistor VR110 which is parallel combined between the two power source terminals and the input terminal of the controllable current distributing device 105, thereby to provide a fixed voltage bias for controlling the controllable current distributing device 105 comprised of linear or switching type solid state or electromechanical components or thyristors, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required, such as that figure 14 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the controllable current distributing device is controlled by a voltage

output control device with adjustable and setting permissive bias.

14) The controllable current distributing device 105 comprised of linear or switching type solid state or electromechanical components or thyristors is controlled by the output voltage control device 106 which is further controlled by the pulse-width modulation functioning voltage output control device CL110 for pulse-width modulation (PWM) control, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required, such as that figure 15 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the controllable current distributing device is controlled by the pulse-width modulation functioning voltage output control device for pulse-width modulation voltage output control.

15) The controllable current distributing device 105 comprised of thyristors can be controlled by a phase angle triggering modulation output voltage control device 106 constituted by the variable resistor VR111, phase shifting capacitor C110, and triggering diode D110, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device

105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required, such as that figure 16 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the controllable current distributing device comprised of thyristors can be controlled by a phase angle triggering modulation output voltage control device.

16) The DC power source which is parallel combined with the controllable current distributing device 105 is series combined with a isolating diode 107 in current direction thereby to connect the output voltage control device 106 and the load, such as that figure 17 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit, wherein its output terminals are series combined with a isolating diode in the current direction.

17) The DC power source which is parallel combined with the controllable current distributing device 105 is series combined with a isolating diode 107 in current direction thereby to parallel combined with the output voltage control device 106 and further parallel combined with the second wave filter capacitor 108 to connect the load, such as that figure 18 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that the output terminals are

parallel combined with a wave filter capacitor.

18) The application output circuit of the active capacitor regulating type controllable voltage and current power supply circuit is combined by the aforesaid respective functional circuits described in 1)~7), 9)~17)

19) The active capacitor regulating type controllable voltage and current power supply circuit combined by the functional circuits described in 1)~7), 9)~18), whereof its output terminals are for driving the resistive type or resistive and inductive mixing type or rechargeable battery type DC loads.

20) The active capacitor 101 is directly series combined between the single phase AC power source 100 and the load 109, while the two AC power output terminals leading to the load 109 are parallel combined with a full wave current rectifier device 103, whereby the positive and negative output terminals of the full wave current rectifier device 103 is further parallel combined with a controllable current distributing device 105 comprised of solid state linear or switching solid state controllable current distributing components in the polar direction, as well as that the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to control the output voltage control device 106 and further to modulate the AC output voltage or current, wherein figure 19 is a circuit schematic diagram of the active capacitor regulating type

controllable voltage and current power supply circuit illustrating that the active capacitor is series combined between the single phase AC current power source and the load, while the two AC power output terminals leading to the load are parallel combined with a full wave current rectifier device and a controllable current distri-buting device.

The rear section output circuit of the active capacitor regulating type controllable voltage and current power supply circuit can be further relying on rearranging the multi-level series combination type controllable current distributing device to constitute a multiple voltage output circuit, therein the multi-level series combination type controllable current distributing circuit is characterized in that two or more than two linear or switching type solid state or electromechanical components or thyristors are series combined first and are then parallel combined with the output terminals of the front section power source, while each controllable current distributing circuit is individually combined with its matching output control device for its individual control, in addition, the two terminals of the power source and the series connecting point of each controllable current distributing component commonly constitutes the multiple voltage extractions thereby to individually provide output to drive the individual load.

Figure 20 is the first example of the active capacitor regulating type controllable voltage and current power supply circuit illustrating the multiple voltage extractions output circuit, thereof in the embodying

example of figure 20, a front section current rectifying circuit with full wave rectified current function is installed, while the two controllable current distributing circuits 105 comprised of two linear or switching type solid state or electromechanical components are first series combined in polarity direction, then are parallel combined with the power source, therein each circuit is respectively coupled with each individual output control device 106, thereby the multiple voltage extractions are constituted by the series combining point between the aforesaid two controllable current distributing circuits and the positive or negative power source for individual outputs to drive the individual load, in addition, each of the two aforesaid circuits can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

Figure 21 is the second example of the active capacitor regulating type controllable voltage and current power supply circuit illustrating the multiple voltage extractions output circuit, thereof in the embodying example of figure 21, a front section current rectifying circuit with full wave rectified current function is installed, while the two controllable current distributing circuits 105 comprised of two thyristors SCR110 are first series combined in polar direction and then are parallel combined with the power source, and each circuit is respectively coupled with each individual output control

device 106, thereby the multiple voltage extractions are constituted by the series combining point between the aforesaid two controllable current distributing circuits and the positive or negative power source for individual outputs to drive the individual load, in addition, each of the two aforesaid circuits can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

Figure 22 is the third example of the active capacitor regulating type controllable voltage and current power supply circuit illustrating the multiple voltage extractions output circuit, thereof in the embodying example of figure 22, the active capacitor 101 is series combined with the AC power source 100, whereby the AC terminals of the two full wave bridge type current rectifying device 103 are mutually series combined and then are parallel combined with the output terminals of the AC power source 100, while each of the two linear or switching type solid state or electromechanical components is connected to the positive and negative terminals of the individual bridge type current rectifier device 103 in polar direction, thereby to constitute the controllable current distributing device 105, therein the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to further control

the output voltage control device 106 and the series combining points of the aforesaid two full wave current rectifier device 103 and the two AC power source terminals constitute multiple AC output voltage or current extractions.

The aforesaid embodying examples of the active capacitor regulating type controllable voltage and current power supply circuit with multiple voltage extractions distributing output circuit is based on the example of two stage output voltage, hereto in practical applications, two or more than two stages circuit based on the embodying examples described in figures 1~22 can be designed, wherein the constituting principles of the multiple voltage extraction distributing circuit includes the following:

- The voltage stages of the multiple voltage extractions distributing output circuit can be of two stages or more than two stages;
- Same numbers of the controllable current distributing devices 105 can be installed according to voltage stages of the multiple voltage extraction distributing output, wherein their series combining points can be used for multiple voltage extraction output;
- Same number of voltage control devices 106 can be installed according to voltage stages of the multiple voltage extraction distributing output to individually control the current distributing device 105;
- A common output voltage control device can be installed to individually control the controllable current distributing devices 105;

Besides, application circuits of the active capacitor regulating type controllable voltage and current power supply circuit with single voltage output or multiple voltage extractions output includes the following system constitutions:

1) The controllable current distributing device 105 can be controlled by the output voltage control device 106 in the following control circuit embodiment types including fixed bias, or proportional bias, or phase angle triggering modulation, etc. Whereby a primary voltage stabilizing circuit between the output voltages can be omitted allowing the circuit to react with the output voltage variations;

2) The controllable current distributing device 105 can be controlled by the output voltage control device 106 in the following control circuit embodiment types including fixed bias, or proportional bias, or phase angle triggering modulation, etc. Whereby a primary voltage stabilizing circuit can be installed between the output voltages to improve the control on the controllable current distributing device affected by the voltage variations;

Figure 23 is a circuit schematic diagram of the active capacitor regulating type controllable voltage and current power supply circuit illustrating that a voltage stabilized circuit is installed before the output terminals, wherein the primary voltage stabilizing circuit is mainly comprised of the output voltage control device 106, voltage distributing resistor R201, and the zener diode ZD201 which is parallel combined between the two

terminals of the output voltage control device, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required;

3) If the controllable current device 105 is controlled by the pulse-width output voltage control device CL110 for pulse-width modulation (PWM), the primary voltage stabilizing circuit between the output voltages can be selected to be installed or not installed;

4) The load side feedback signal is accepted by the output voltage control device 106 to control the current distributing device 105 for providing corresponding distributing current, thereby to control the terminal voltage or output current.

As summarized from the above descriptions, the invention is by series combining the capacitors and bridge type current rectifier devices to constitute a voltage reducing and current limiting rectifying circuit, while a controllable current distributing circuit device is parallel combined between the output terminals of the current rectifying circuit thereby to actively control the output voltage setting status, therefore the invention is so innovative with clear circuit functional effectiveness, your lawful approval is greatly appreciated.

CLAIMS

1. An active capacitor regulating type controllable voltage and current power supply circuit is disclosed with a voltage reducing and current limiting rectifying circuit which is constituted by capacitors and a bridge type current rectifier device, wherein it is characterized in that the output terminals of the rectifying circuit are parallel installed with a current distributing circuit device, thereby to actively control the output voltage setting status, wherein it is mainly comprised of the following:

- An AC power Source 100: It is a single phase or multiple phase power source coming from city power or from the secondary AC power source of transformer;
- An active capacitor 101: It is constituted by all kinds of capacitors 101 suitable for application with AC power, thereof it can be directly series combined between the AC power source 100 and the current rectifier device 103 or can be series combined between the AC power source 100 and the primary terminals of transformer 102; or can be series combined between the secondary terminals of transformer 102 and current rectifier device 103; wherein the two end terminals of capacitor 101 can be further parallel combined with relieving resistor R101;
- A transformer 102: The transformer 102 is installed between the AC power source 100 and current rectifier device 103 for changing the voltage value of the AC power source 100, wherein it is comprised

of an isolated type structure with primary and secondary isolated windings or a self-coupled transformer structure with self-coupled windings, whereof its secondary output windings can be a three terminals type secondary windings with intermediate extractions or the two terminals type secondary windings; whereof the transformer 102 is a selective device which can be installed if required by the circuit, and the active capacitor 101 can be series combined between the primary terminals or secondary terminals of the transformer 102, or the transformer 102 can be omitted instead while the AC power source 100 and the active capacitor 101 is directly series combined before providing input to the current rectifier device 103;

- A current rectifier device 103: It is a full wave bridge type current rectifier device comprised of solid state rectifiers for converting input AC power into full wave DC output;
- A first wave filter capacitor 104: It is parallel combined between the output positive and negative terminals of the current rectifier device 103 whereby to reduce voltage pulsation, wherein the capacitor can be selected to be installed or not installed;
- A controllable current distributing device 105: It is constituted by a linear or switching type solid state or electromechanical components or thyristors, wherein it is parallel combined between the output terminals of the current rectifier device 103 to

generate linear or switching type current distributing functions at load decrease or output voltage increase of current rectifier 103 due to rising power source terminal voltage, thereby to maintain a stable output voltage;

- An output voltage control device 106: It is comprised of electromechanical or solid state components for controlling the operating status of the controllable current distributing device 105, and further to control the output terminal voltage of the active capacitor regulating type controllable voltage and current power supply circuit; wherein it is comprised of : 1) the current limiting resistor R110 and zener diode ZD110 are series combined and are then parallel combined between the power source and control terminal of the controllable current distributing device thereby to constitute a voltage output control device with a fixed bias; 2) the fixed voltage distributing resistors R111, R112 are parallel combined between the two terminals of power source, while a zenor diode ZD110 can be series combined between its extraction terminal and the controllable current distributing device thereby to constitute a voltage output control device with a proportional bias; 3) a variable resistor VR110 can be parallel combined between the two terminals of power source, while a zener diode ZD110 can be series combined between the output terminal of the variable resistor and the controllable current distributing device thereby to constitute a voltage

output control device with a controllable bias; 4) the voltage output control device comprising of the pulse-width modulation functioning output voltage control device CL110 is used to perform PWM control the controllable current distributing device; 5) the voltage output control device is constituted by a phase angle triggering modulation circuit;

- A isolating diode 107: it is for series combined between the power source output terminal leading to the second wave filter capacitor 108 and further to the load 109, thereby to prevent the accumulated power at the second wave filter capacitor 108 from flowing back to the power source; therein the isolating diode 107 can be selected to be installed or not installed according to circuit requirement;
- A second wave filter capacitor 108: it is parallel combined between the circuit output terminals leading to the load for further reducing the voltage pulsation, wherein the capacitor can be selected to be installed or not installed;
- A load 109: it is a resistive load or resistive and inductive mixing type load or rechargeable and accumulative type load or rotational electrical machine type load for matching with the active capacitor regulating type controllable voltage and current power supply circuit;
- The active capacitor regulating type controllable voltage and current power supply circuit can be installed with various type overload or short circuit protecting components such as safe fuse,

circuit breaker and various surge voltage absorbing protective components as well as various noise absorbing components;

- A load terminal voltage detector device 110: it is coupled between the two terminals of load 109 for transferring the detected voltage feedback signal to the output voltage control device 106 thereby to provide voltage feedback control function on the controllable current distributing device, whereof the load terminal voltage detector device is comprised of electromechanical or solid state circuit components, which can be selected to be installed or not installed;
- A load current detector device 111: it is series combined between the load 109 and the power source for transferring detected current signal to the voltage output control device 106 thereby to provide current feedback control function on controllable current distributing device 105, whereof the load current detector device 111 is comprised of electromechanical or solid state circuit components, which can be selected to be installed or not installed;
- A control interface 112: it is a manual or electromechanical signal control interface comprised of electromechanical or solid state circuit components for controlling the voltage output control device 106 and controllable current distributing device 105, wherein the control interface 112 can be selected to be installed or not

installed according to system requirements.

2. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein it includes that the active capacitor 101 is directly series combined with AC input terminals of the full wave current rectifier device 103.

3. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is series combined with the primary windings of transformer 102, and through the secondary windings of transformer 102 to transfer output to the full wave current rectifier device 103.

4. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is series combined between the secondary winding of the transformer 102 and the current rectifier device 103.

5. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is series combined with the primary winding of the transformer 102 whereby the secondary winding of the transformer 102 with intermediate extractions and two diodes constitute a full wave current rectifier circuit,

6. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein three active capacitors 101 are each respectively series combined between the three phase AC power source and the three phase full wave current

rectifier device 103.

7. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the AC power source transfers output to the three phase transformer 102, whereby three active capacitors 101 are each respectively series combined between the secondary winding of the three phase transformer 102 and the three phase full wave current rectifier device 103.

8. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is series installed between the single phase power source 100 and the load 109, while the AC terminals of the full current bridge type current rectifier 103 are parallel combined with the two AC output terminals, while the positive and negative terminals of the current rectifier device 103 are parallel combined in current direction with the controllable current distributing device 105 as well as that the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to control the output voltage control device 106 and further to modulate the AC output voltage or current.

9. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the full wave rectified full wave pulsating DC

output terminals are directly parallel combined with a controllable current distributing device 105 which is comprised of linear or switching type solid state or electromechanical components or thyristors for accepting control by the voltage output control device 106, in addition, the circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

10. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the full wave rectified DC output terminals are first parallel combined with the first wave filter capacitor 104 and then parallel combined with a controllable current distributing device 105 which is comprised of linear or switching type solid state or electromechanical components or thyristors for accepting control by the voltage output control device, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

11. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the controllable current distributing

device 105 comprising of linear or switching type solid state controllable current distributing components or electromechanical components are controlled by a voltage output control device 106 with fixed bias, wherein the fixed bias is obtained including from the series combined zener diode ZD101 (including the further series installed current limiting resistor R110), in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

12. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the controllable current distributing device 105 comprised of thyristor SCR 110 is controlled by a variable resistor VR110, wherein the controllable voltage bias is obtained by the variable resistor VR110 and the series combined zener diode ZD110 with its output terminals, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

13. The active capacitor regulating type controllable

voltage and current power supply circuit as in claim 1, wherein the voltage output control device 106 is constituted by series combining a zener diode ZD110 between the extraction terminal of the voltage distributing resistors R111 and R112 which is parallel combined between the two power source terminals and the control terminal of the controllable current distributing device 105, thereby to provide a proportional voltage bias for controlling the controllable current distributing device 105 comprised of linear or switching type solid state or electromechanical components or thyristor SCR110, wherein the aforesaid voltage distributing resistor includes the constitution by other voltage setting permissible circuits. in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

14. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the voltage output control device 106 is constituted by series combining a zener diode ZD110 between the output terminal of the variable resistor VR110 which is parallel combined between the two power source terminals and the input terminal of the controllable current distributing device 105, thereby

to provide a fixed voltage bias for controlling the controllable current distributing device 105 comprised of linear or switching type solid state or electromechanical components or thyristors, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

15. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the controllable current distributing device 105 comprised of linear or switching type solid state or electromechanical components or thyristors is controlled by the output voltage control device 106 which is further controlled by the pulse-width modulation functioning voltage output control device CL110 for pulse-width modulation (PWM) control, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

16. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the controllable current distributing

device 105 comprised of thyristors can be controlled by a phase angle triggering modulation output voltage control device 106 constituted by the variable resistor VR111, phase shifting capacitor C110, and triggering diode D110, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

17. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the DC power source which is parallel combined with the controllable current distributing device 105 is series combined with a isolating diode 107 in current direction thereby to connect the output voltage control device 106 and the load.

18. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the DC power source which is parallel combined with the controllable current distributing device 105 is series combined with a isolating diode 107 in current direction thereby to parallel combined with the output voltage control device 106 and further parallel combined with the second wave filter capacitor 108 to connect the load.

19. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein it includes the combinations of the

various functional circuits as in the aforesaid claims 2 to claims 8 and claims 10 to claims 18.

20. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein it includes the combination of the various functional circuits as in the aforesaid claims 2 to claims 8 and claims 10 to claim 19, whereof its output terminals are for driving the resistive type or resistive and inductive mixing type or rechargeable battery type DC loads.

21. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is directly series combined between the single phase AC power source 100 and the load 109, while the two AC power output terminals leading to the load 109 are parallel combined with a full wave current rectifier device 103, whereby the positive and negative output terminals of the full wave current rectifier device 103 is further parallel combined with a controllable current distributing device 105 comprised of solid state linear or switching solid state controllable current distributing components in the polar direction, as well as that the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to control the output voltage control device 106 and further to modulate the AC output voltage or current.

22. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein its rear section output circuit can be further relying on rearranging the multi-level series combination type controllable current distributing device to constitute a multiple voltage output circuit, therein the multi-level series combination type controllable current distributing circuit is characterized in that two or more than two linear or switching type solid state or electromechanical components or thyristors are series combined first and are then parallel combined with the output terminals of the front section power source, while each controllable current distributing circuit is individually combined with its matching output control device for its individual control, in addition, the two terminals of the power source and the series connecting point of each controllable current distributing component commonly constitutes the multiple voltage extractions thereby to individually provide output to drive the individual load.

23. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 22, wherein its multiple voltages output circuit is comprised of that a front section current rectifying circuit with full wave rectified current function is installed, while the two controllable current distributing circuits 105 comprised of two linear or switching type solid state or electromechanical

components are first series combined in polarity direction, then are parallel combined with the power source, therein each circuit is respectively coupled with each individual output control device 106, thereby the multiple voltage extractions are constituted by the series combining point between the aforesaid two controllable current distributing circuits and the positive or negative power source for individual outputs to drive the individual load, in addition, each of the two aforesaid circuits can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

24. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 22, wherein its multiple voltages output circuit is comprised of that a front section current rectifying circuit with full wave rectified current function is installed, while the two controllable current distributing circuits 105 comprised of two thyristors SCR110 are first series combined in polar direction and then are parallel combined with the power source, and each circuit is respectively coupled with each individual output control device 106, thereby the multiple voltage extractions are constituted by the series combining point between the aforesaid two controllable current distributing circuits and the

positive or negative power source for individual outputs to drive the individual load, in addition, each of the two aforesaid circuits can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

25. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 22, wherein its multiple voltage extractions output circuit is comprised of that the active capacitor 101 is series combined with the AC power source 100, whereby the AC terminals of the two full wave bridge type current rectifying device 103 are mutually series combined and then are parallel combined with the output terminals of the AC power source 100, while each of the two linear or switching type solid state or electromechanical components is connected to the positive and negative terminals of the individual bridge type current rectifier device 103 in polar direction, thereby to constitute the controllable current distributing device 105, therein the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to further control the output voltage control device 106 and the series combining points of

the aforesaid two full wave current rectifier device 103 and the two AC power source terminals constitute multiple AC output voltage or current extractions.

26. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 22~25, wherein its multiple voltages output circuit includes two or more than two voltage stages designs, and its embodying principles include the following:

The voltage stages of the multiple voltage extractions distributing output circuit can be of two stages or more than two stages;

Same numbers of the controllable current distributing devices 105 can be installed according to voltage stages of the multiple voltage extraction distributing output, wherein their series combining points can be used for multiple voltage extraction output;

Same number of voltage control devices 106 can be installed according to voltage stages of the multiple voltage extraction distributing output to individually control the current distributing device 105;

A common output voltage control device can be installed to individually control the controllable current distributing devices 105.

27. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 1~26, wherein its single voltage output circuits or multiple voltage extractions output circuits are constituted by that the controllable current

distributing device 105 can be controlled by the output voltage control device 106 in the following control circuit embodiment types including fixed bias, or proportional bias, or phase angle triggering modulation, etc. Whereby a primary voltage stabilizing circuit between the output voltages can be omitted allowing the circuit to react with the output voltage variations.

28. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 1~26, wherein its single voltage output circuits or multiple voltage extractions output circuits are constituted by that the controllable current distributing device 105 can be controlled by the output voltage control device 106 in the following control circuit embodiment types including fixed bias, or proportional bias, or phase angle triggering modulation, etc. Whereby a primary voltage stabilizing circuit can be installed between the output voltages to improve the control on the controllable current distributing device affected by the voltage variations.

29. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 1~26, wherein its single voltage output circuits or multiple voltage extractions output circuits are constituted by that if the controllable current device 105 is controlled by the pulse-width output voltage control device CL110 for pulse-width modulation (PWM), the primary voltage stabilizing

circuit between the output voltages can be selected to be installed or not installed.

30. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 1~26, wherein its single voltage output circuits or multiple voltage extractions output circuits are constituted by that the load side feedback signal is accepted by the output voltage control device 106 to control the current distributing device 105 for providing corresponding distributing current, thereby to control the terminal voltage or output current.

ABSTRACT

The active capacitor regulating type controllable voltage and current power supply circuit is disclosed with a voltage reducing and current limiting rectifying circuit which is constituted by capacitors and a bridge type current rectifier device, wherein it is characterized in that the output terminals of the rectifying circuit are parallel installed with a current distributing circuit device, thereby to actively control the output voltage setting status.

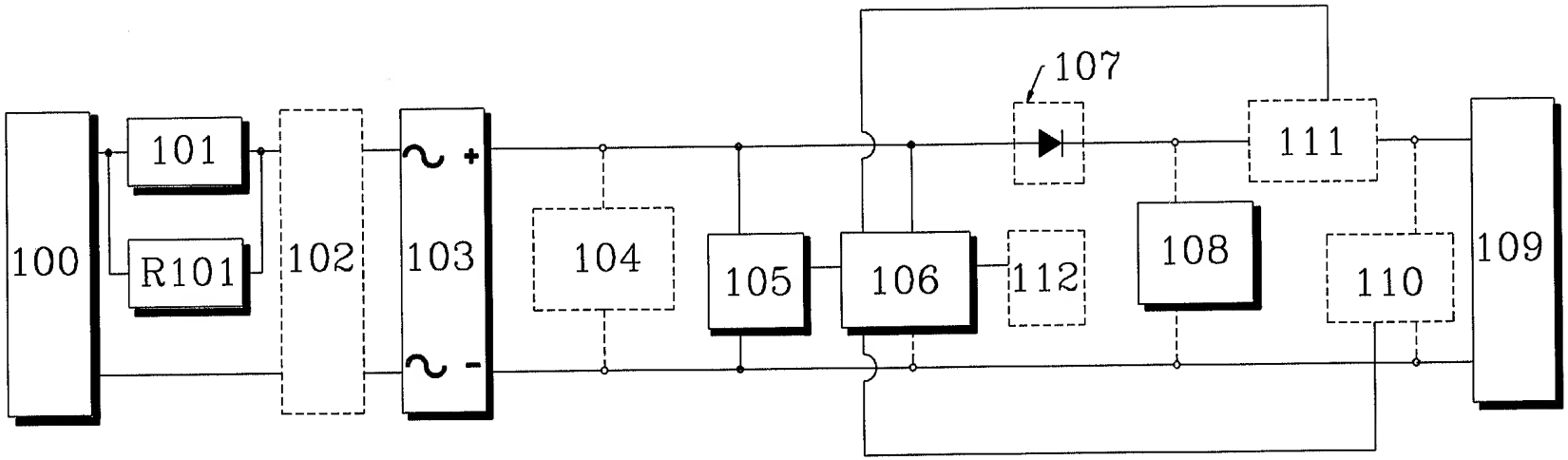

FIG. 1

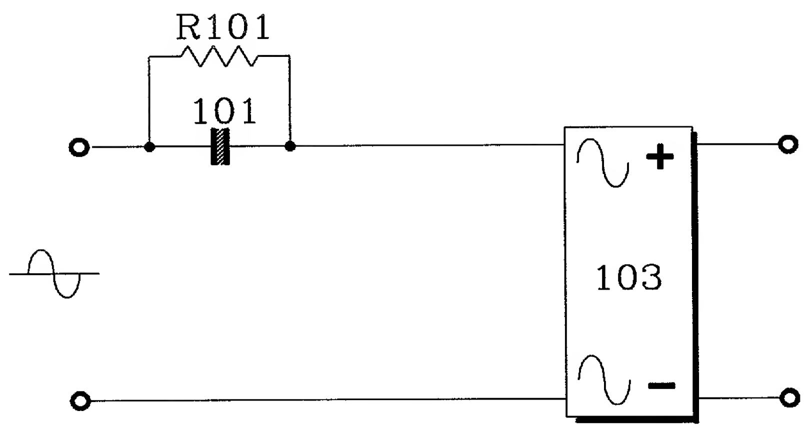

FIG.2

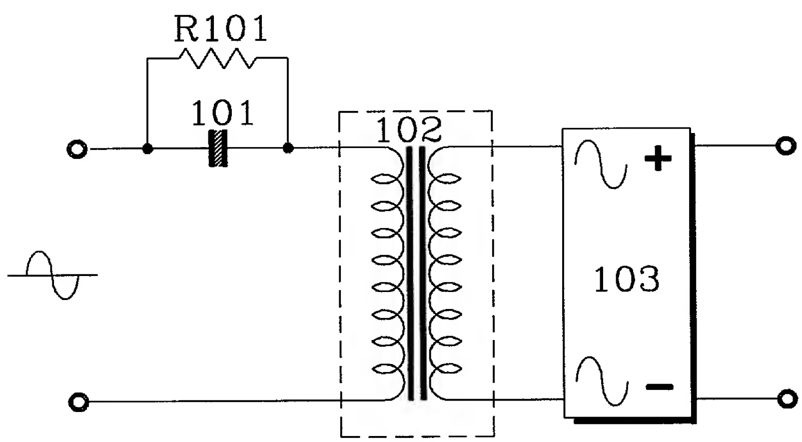

FIG.3

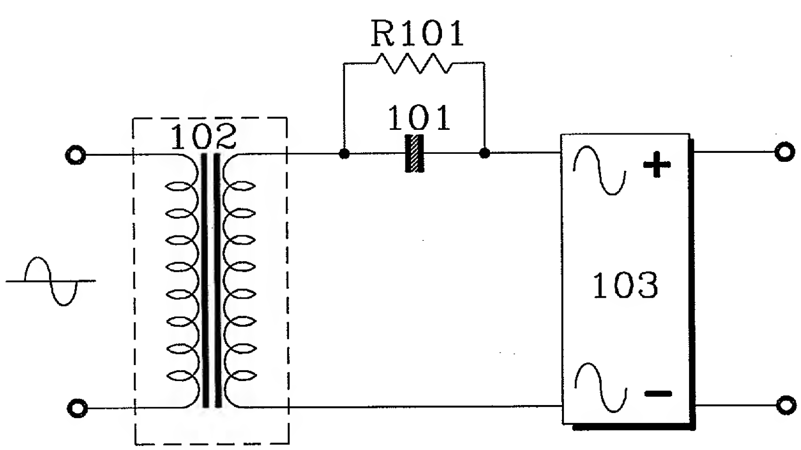

FIG.4

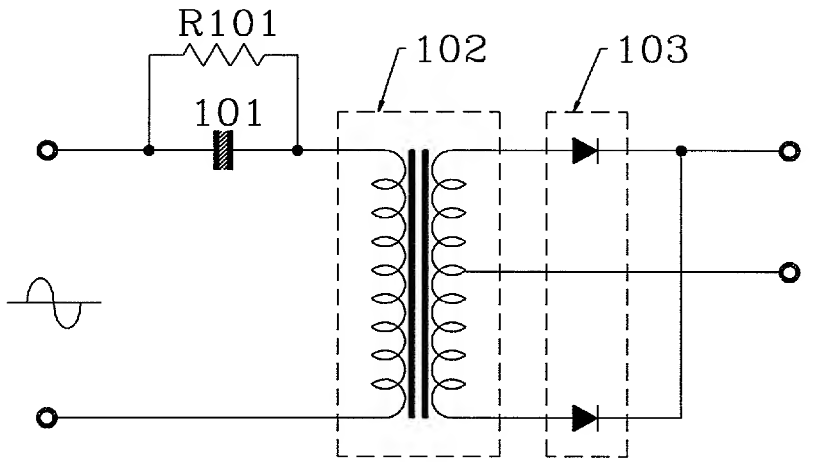

FIG.5

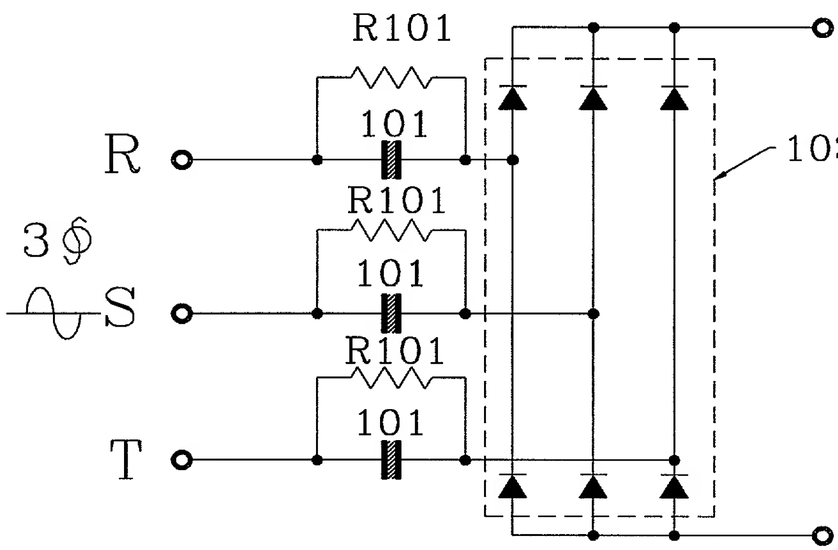

FIG.6

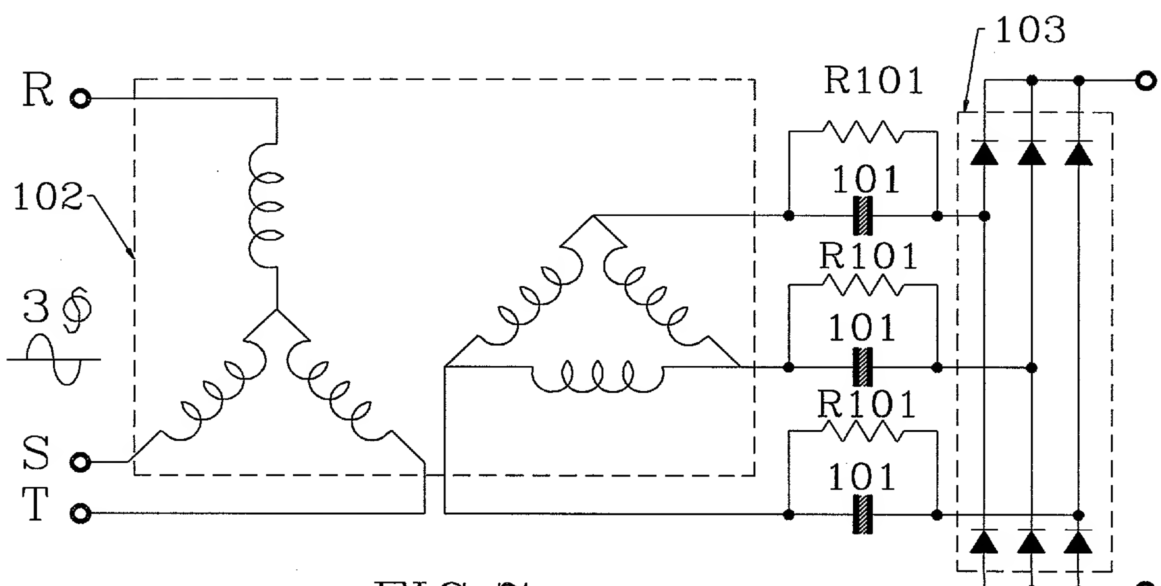

FIG.7

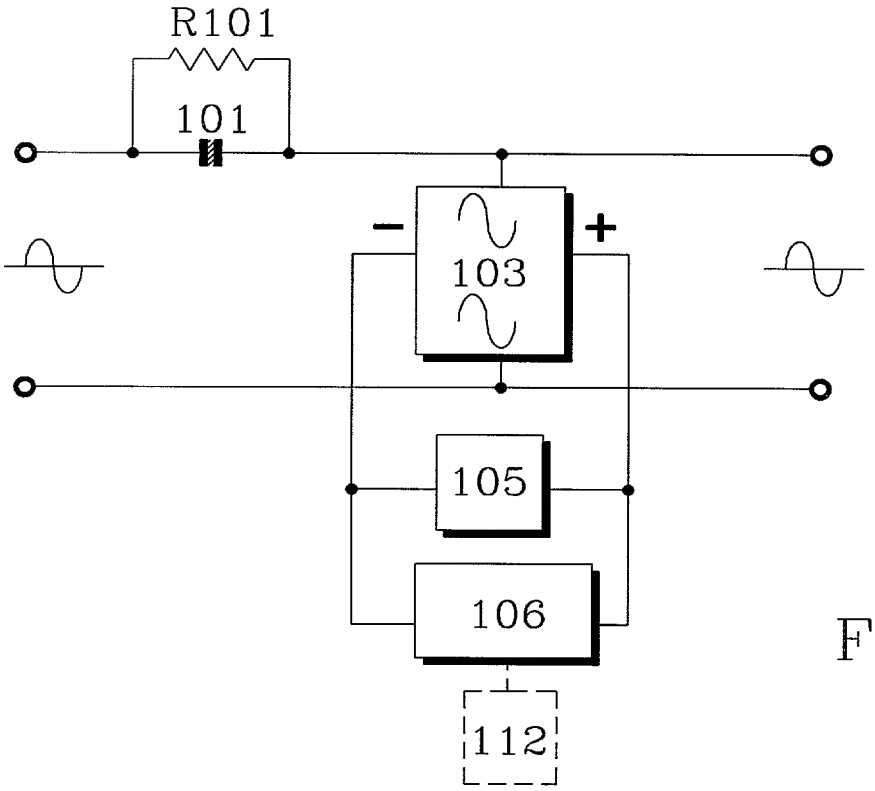

FIG.8

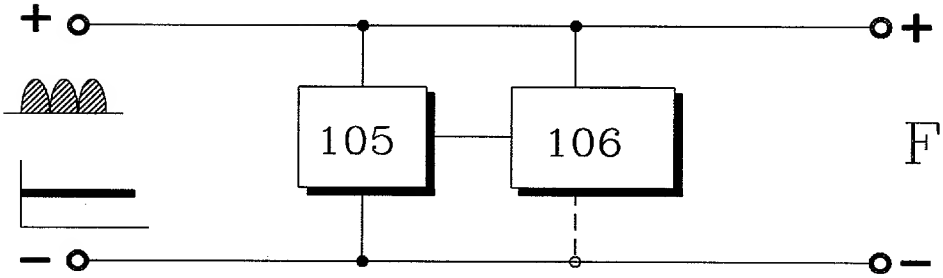

FIG.9

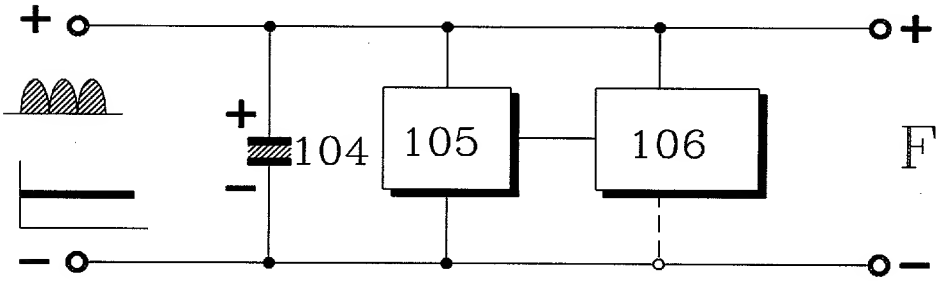

FIG.10

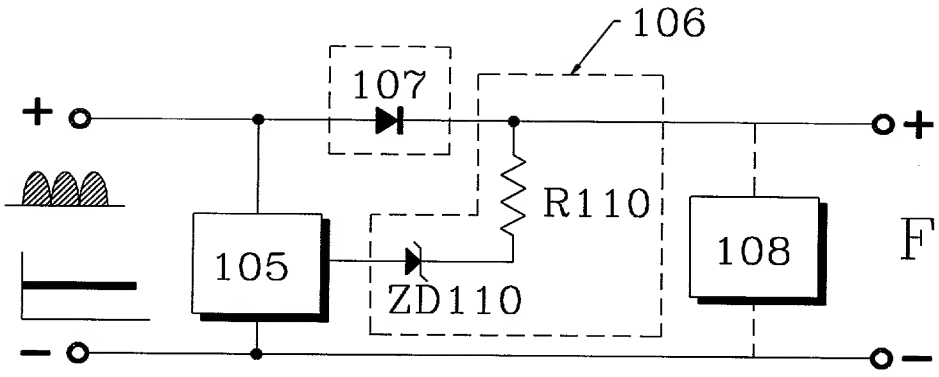

FIG. 11

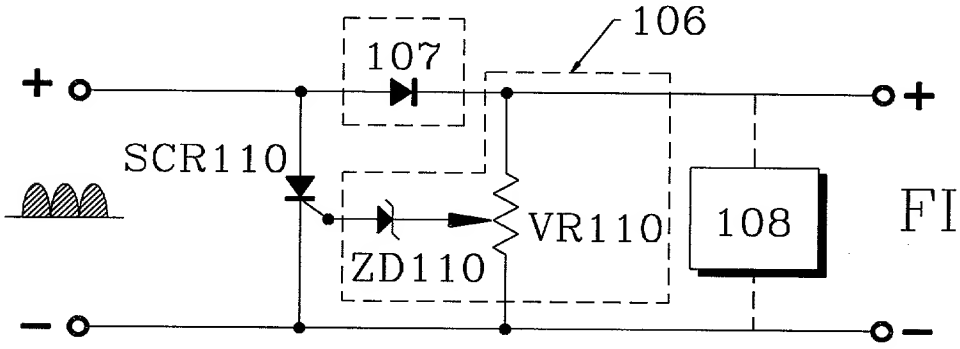

FIG. 12

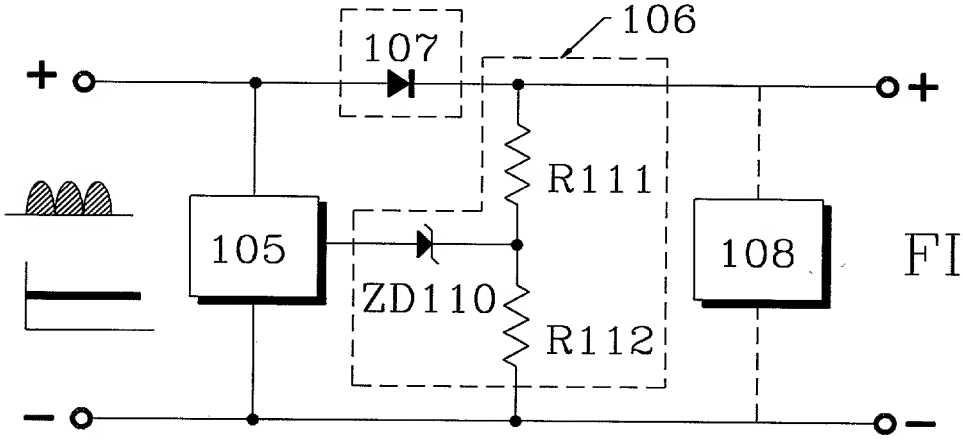

FIG. 13

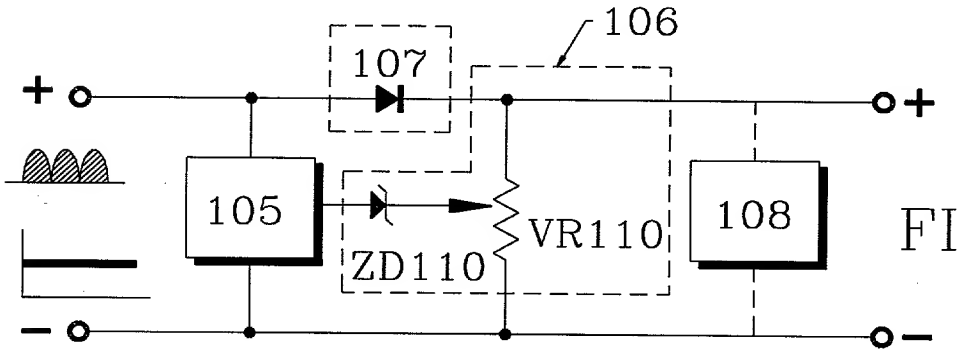

FIG. 14

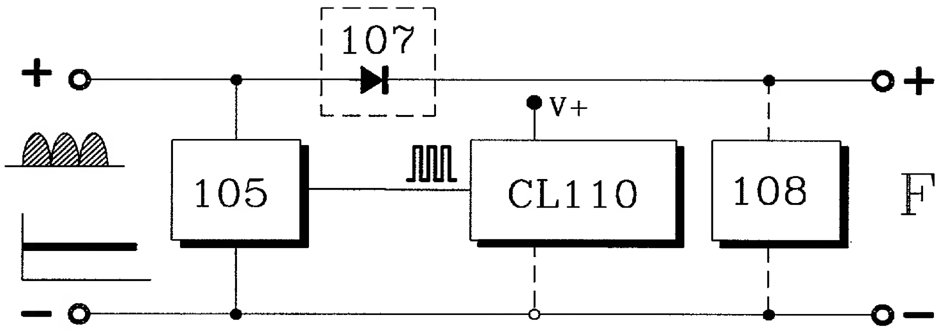

FIG. 15

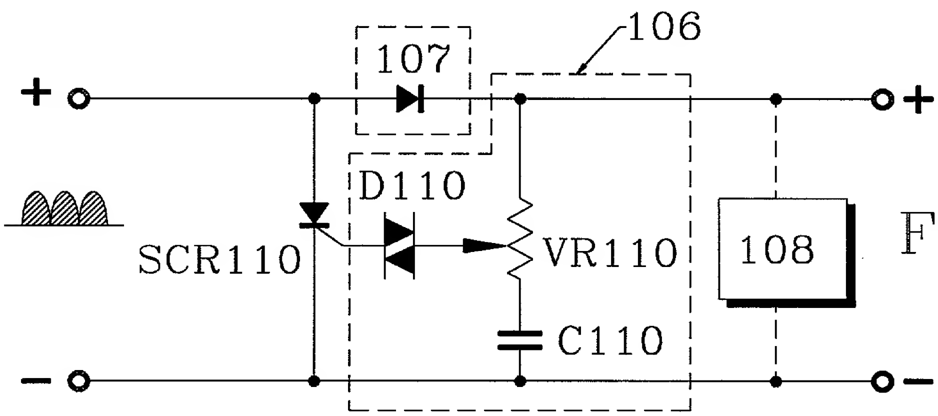

FIG. 16

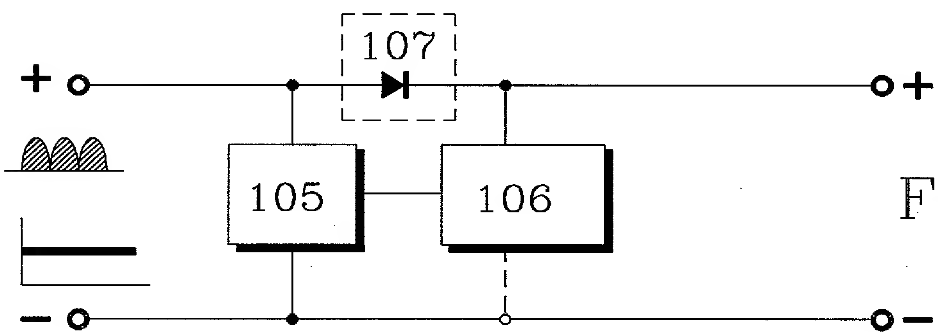

FIG. 17

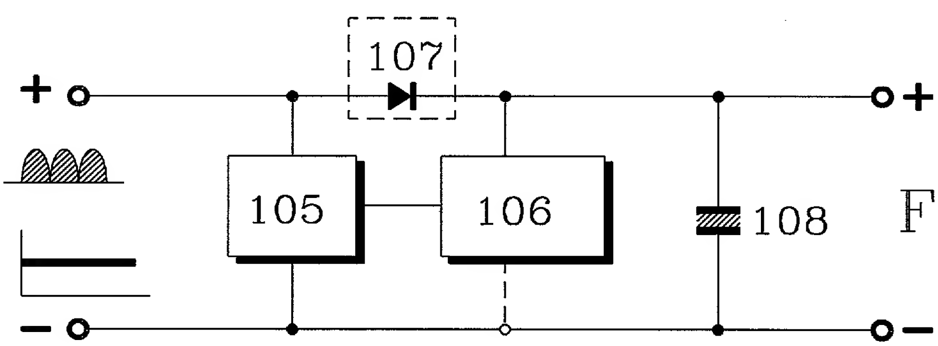

FIG. 18

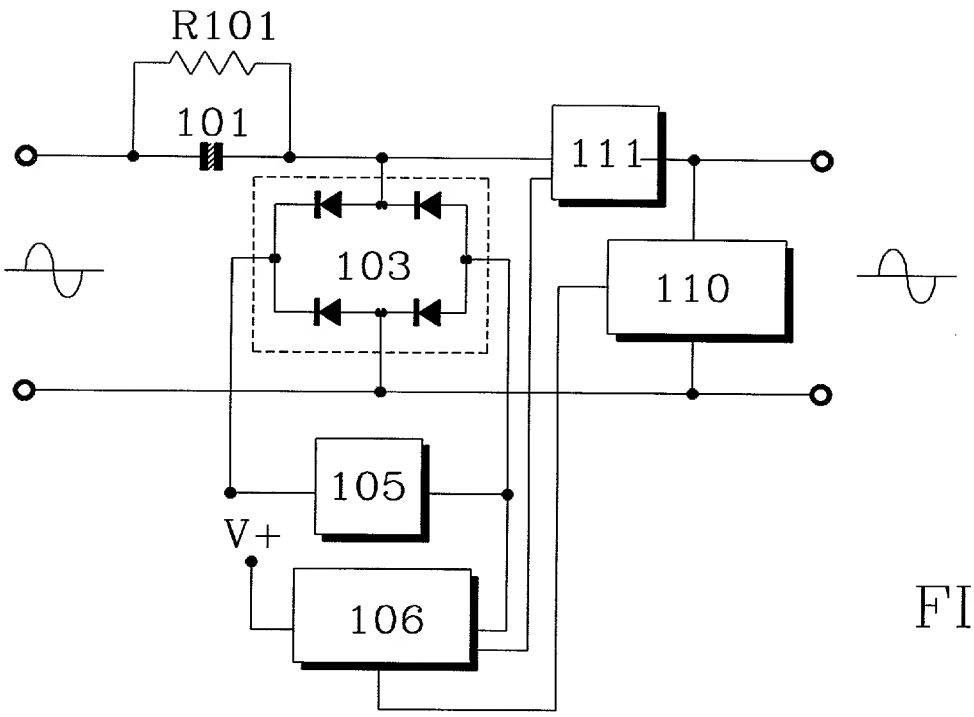

FIG.19

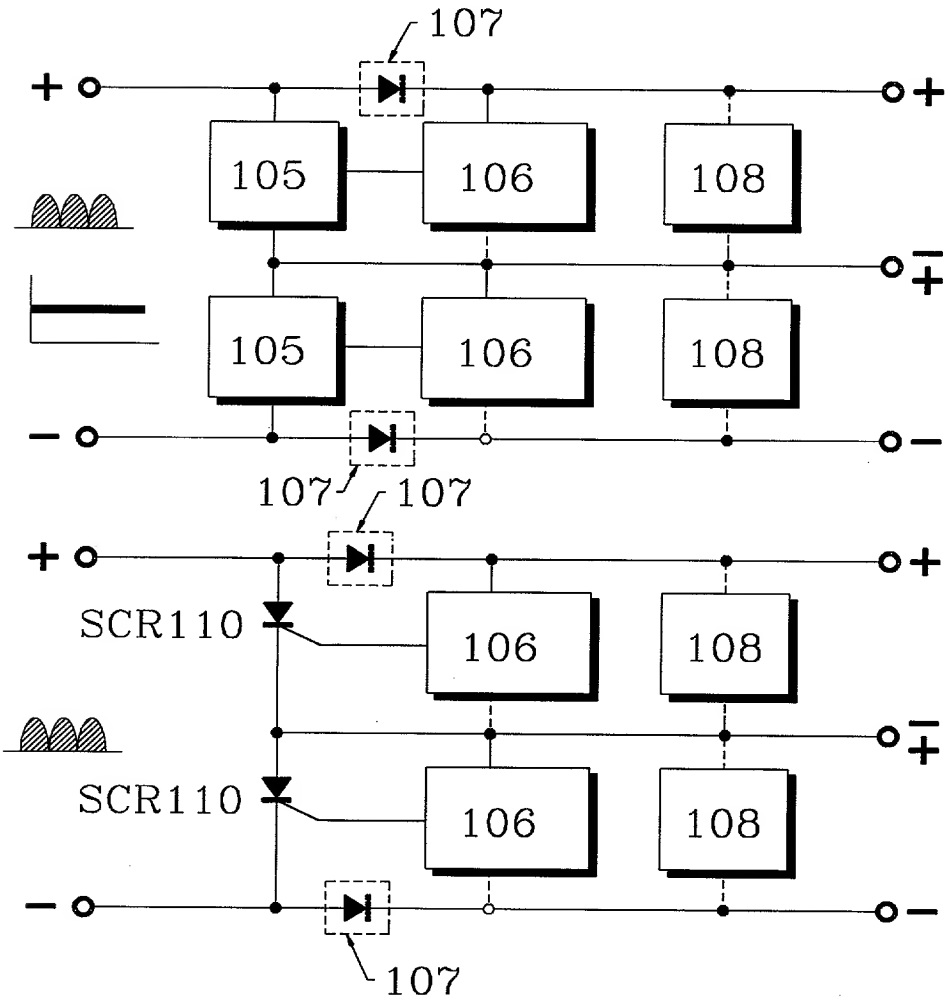

FIG.20

FIG.21

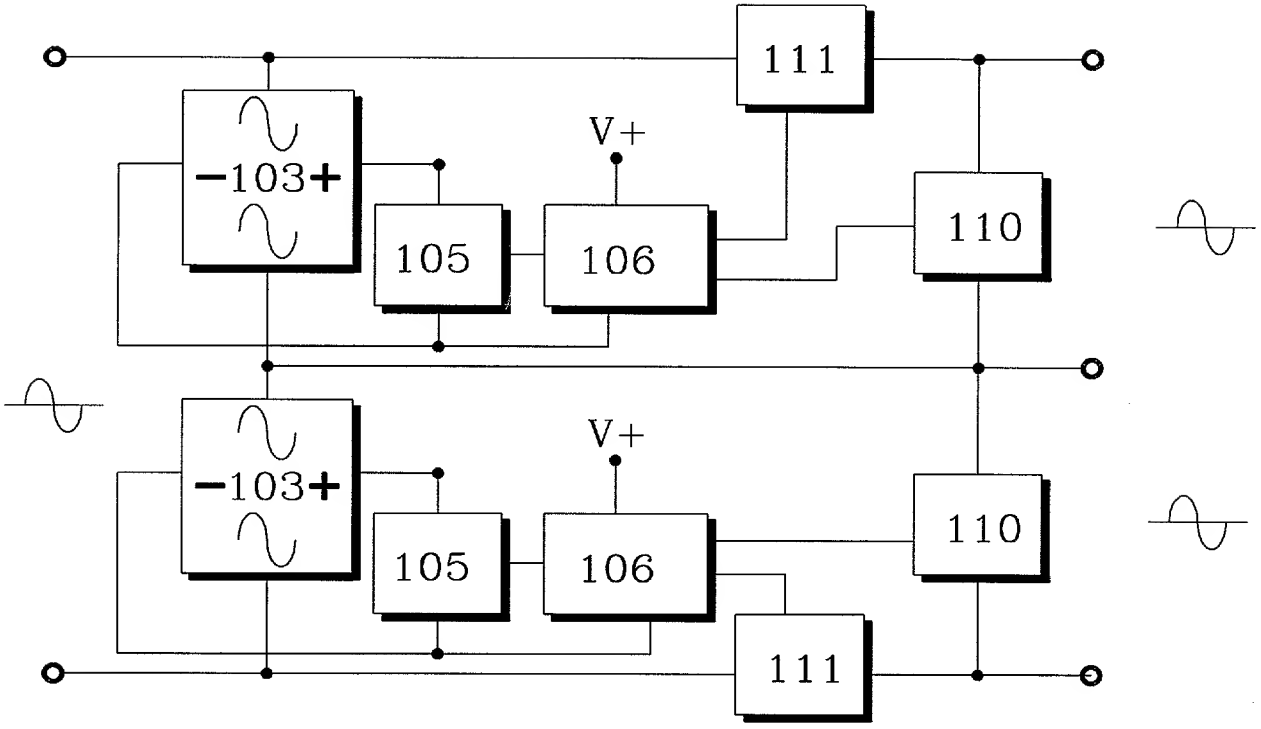
111
V+
103
105
106
110
V+
103
105
106
110
111

FIG.22

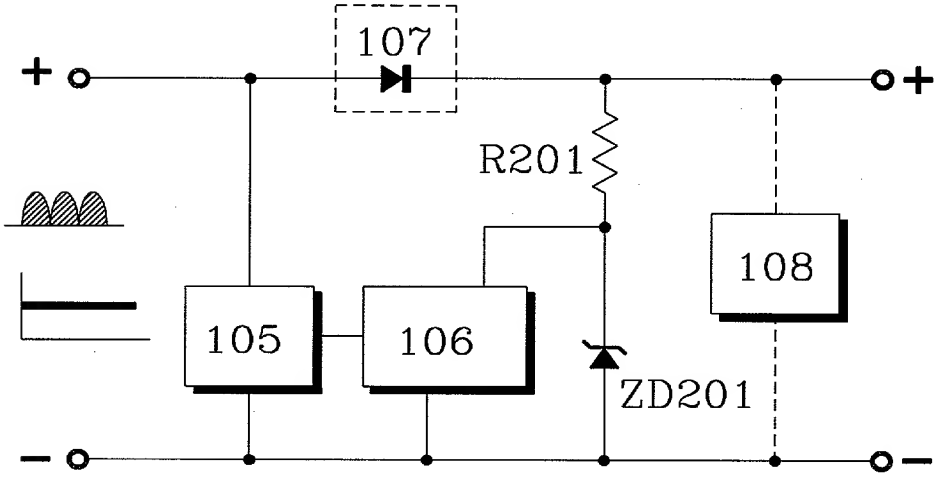
107
+
+
R201
108
105
106
ZD201
−
−

FIG.23

ATTORNEY/DOCKET NO: _____

DECLARATION FOR PATENT APPLICATION AND APPOINTMENT OF ATTORNEY

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name; I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention (Design, if applicable) entitled THE ACTIVE CAPACITOR REGULATING TYPE CONTROLLABLE VOLTAGE AND CURRENT POWER SUPPLY CIRCUIT

the specification of which (check one):

☒ is attached hereto.

☐ was filed on _____ as Application Serial No. _____, and was amended on _____ (if applicable).

☐ was filed on _____ as International Application (PCT) No. _____, and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with *Title 37, Code of Federal Regulations, §1.56(a).* I hereby claim foreign priority benefits under *Title 35, United States Code §119* of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)			*PRIORITY CLAIMED*	
86116415	Taiwan, R.O.C.	30/10/1997	☐ Yes	☒ No
Number	Country	Day/Month/Year Filed		
Number	Country	Day/Month/Year Filed	☐ Yes	☐ No
Number	Country	Day/Month/Year Filed	☐ Yes	☐ No
Number	Country	Day/Month/Year Filed	☐ Yes	☐ No

I hereby claim the benefit under *Title 35, United States Code, §120* of any United States application(s) or PCT international application(s) designating The United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of *Title 35, United States Code, §112,* I acknowledge the duty to disclose material information as defined in *Title 37, Code of Federal Regulations, §1.56(a)* which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Application Number	Filing Date	Status - Patented, Pending or Abandoned
Application Number	Filing Date	Status - Patented, Pending or Abandoned

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under *section 1001 of title 18 of the United States Code* and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: I (We) hereby appoint as my (our) attorneys, with full powers of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: J. Ernest Kenney, Reg. No. 19,179; Eugene Mar, Reg. No. 25,893; Richard E. Fichter, Reg. No. 26,382; Charles R. Wolfe, Jr., Reg. No. 28,680; Thomas J. Moore, Reg. No. 28,974; David E. Dougherty, Reg. No. 19,576; Bruce H. Troxell, Reg. No. 26,592, and _____

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☐ *See following pages for additional joint inventors.*

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Applicant or Patentee: Tai-Her YANG
Serial or Patent Number: _____
Filed or Issued: _____
For: THE ACTIVE CAPACITOR REGULATING TYPE CONTROLLABLE VOLTAGE AND CURRENT POWER SUPPLY CIRCUIT

Docket #: _____
Examiner: _____
Art Unit: _____

VERIFIED STATEMENT (DECLARATION) BY AN INDEPENDENT INVENTOR CLAIMING SMALL ENTITY STATUS UNDER *37 CFR 1.9(F) AND 1.27(B)*

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in *37 CFR 1.9(c)* for purposes of paying reduced fees under *section 41(a) and (b) of Title 35, United States Code*, to the Patent and Trademark Office with regard to the invention entitled THE ACTIVE CAPACITOR REGULATING TYPE CONTROLLABLE VOLTAGE AND CURRENT POWER SUPPLY CIRCUIT
by Tai-Her YANG
Inventor(s)
described in:

- ☒ The specification filed herewith.
- ☐ Patent application serial number _____, filed _____.
- ☐ PCT International patent application number _____, filed _____.
- ☐ Patent number _____, issued _____.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license any rights in the invention to any person who could not be classified as an independent inventor under *37 CFR 1.9(c)* if that person had made the invention, or to any concern which would not qualify as a small business concern under *37 CFR 1.9(d)* or a nonprofit organization under *37 CFR 1.9(e)*.

Each person, concern or organization to which I have assigned, granted, conveyed or licensed or am under an obligation under contract or law to assign, grant, convey or license any rights in the invention is listed below:

- ☒ No such person, concern or organization.
- ☐ Persons, concerns or organizations listed below. **Note:** Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities *(37 CFR 1.27)*.

Full Name: _____
Address: _____
☐Individual ☐Small Business Concern ☐Nonprofit Organization

Full Name: _____
Address: _____
☐Individual ☐Small Business Concern ☐Nonprofit Organization

☐See attached sheet for additional person(s), concern(s) or organization(s).

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate *(37 CFR 1.28(b))*.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under *section 1001 of Title 18 of the United States Code*, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which the verified statement is directed.

	Inventor 1	*Inventor 2*	*Inventor 3*
Name	Tai-Her YANG		
Signature	Tai-Her Yang		
Date	NOV. 17, 1999		